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DEVELOPMENT OF A COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM FOR THE MISSOURI-SOURIS-RED RIVER BASINS

Federal Water Pollution Control Administration
Kansas City, Missouri

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A COMPREHENSIVE PROGRAM FOR WATER POLLUTION CONTROL

The objectives of the program are to restore and preserve the quality of surface and ground water to protect public health and to meet the public's desires and expectations for clean water. The program will meet these objectives in a highly efficient manner through systematic application of a combination of water pollution control measures. These measures include: (1) elimination or reduction of pollution at its source; (2) removal of polluting materials from waste water discharges by treatment methods; (3) control of times of release of waste waters to minimize pollutional effects; and (4) after application of treatment and control at the source, by regulation of streamflow for water quality control.

In the development of this program:

1. Desires and expectations of the public for clean water are identified by consultation with those individuals, industries, municipalities, civic groups, and public officials concerned with the quality of water in the basin.

2. Through an exchange of information between the water users groups and the project staff, public desires are translated into measurable water quality characteristics and water quality goals are established.

3. Engineering, scientific, and economic technology is applied to determine blends of alternative methods of achieving these quality goals and to evaluate their relative effectiveness, dependability, cost, and acceptance.

4. Means and measures for controlling pollution and conserving water quality are implemented as rapidly as possible through coordinated participation of water users, pollution control authorities, construction agencies, and other interest groups.

This program will be developed in cooperation with other Federal agencies, the States, and industries and municipalities concerned.

DEVELOPMENT OF A COMPREHENSIVE WATER POLLUTION CONTROL PROGRAM

For The

MISSOURI-SOURIS-RED RIVER BASINS

Authority

The Federal Water Pollution Control Act requires that the Secretary of the Interior develop comprehensive water pollution control programs in cooperation with other Federal, State, Interstate, and local water pollution control agencies for eliminating or reducing water pollution in surface and underground sources to maintain a water quality suitable for all beneficial purposes. The Act also requires that, in planning any Federal reservoir, consideration must be given to storage for flow regulation for water quality control. The Secretary of the Interior must advise the appropriate Federal construction agencies on the need for and the value of such storage. The Secretary of Health, Education and Welfare will advise relative to the health aspects of the need for and value of the inclusion of storage for regulation of streamflow for water quality control at Federal reservoirs.

Study Area

The Missouri-Souris-Red River Basin study area encompasses the portion of the United States that is the watershed of the Missouri, Souris, Red River of the North, and Rainy river systems. These river systems drain all or parts of ten north-central States (Figure 1).

Problem Significance

The streams and aquifers of the Missouri-Souris-Red River of the North Basins are important sources of water, serving all phases of the area's economy, providing for such needs as water supply, navigation, irrigation, recreation, removal of wastes, etc. Multi-purpose use and reuse has resulted in a number of major water quality problems. Increasing demands will require additional reuse of the waters.

The utilization of the waterways for disposal of wastes have created localized pollution problems, with dissolved oxygen deficits, and bacterial build-ups. A large majority of the municipalities in the basin have treatment works in operation or under construction, but many of the plants are overloaded. Below most of the larger towns and in many other reaches, the quality of the water in the receiving stream has deteriorated. In some instances, fish kills have resulted.

Treated wastes dicharged and surface runoff from agricultural lands have increased the algal nutrients in the streams. Impoundments have reduced the natural turbidity. The combination of these two has resulted in algal blooms creating complex taste and odor problems in municipal water supplies. This is a recurring problem, especially on the lower Missouri River.

Agriculture is a major occupation. Pesticides, herbicides,

and associated agricultural wastes carried by stream runoff and return irrigation flows are degrading stream quality. Salts leached from soils or flushed from irrigated areas in Kansas and the Dakotas have increased the total dissolved solids far in excess of desirable concentrations.

More than 1,000 food processing plants are operating in the study area. They freeze, can, grind, package and otherwise process meat, dairy products, fruit, vegetables, potatoes, sugar beets, grain and other products. The handling of such wastes in the northern part of the study area is further complicated by the severe weather conditions during the winter.

The overall problem to be resolved through careful examination of present physical makeup of the waterways, together with forecasts as to probable future changes, is that of providing a water quality which will meet local use requirements in such a manner as to permit a continued high level of public health, economic and recreational opportunities throughout the Missouri-Souris-Red River of the North Basins.

Primary Functions of the Project

Many data concerning water quality and pollution have been collected in the Missouri-Souris-Red River Basins and are available for use in the study. The majority of these data, focused on specific or localized problems, were used in the development of more than 200 reports concerning water quality and pollution studies by State and Federal agencies since 1950. In most cases, these reports have not evaluated the effects on water quality for specific beneficial uses of the resources development programs. Neither have these reports developed the predictive techniques necessary to arrive at reasonable estimates of future water quality problems, under a variety of development schemes. The Comprehensive Water Pollution Control Program will be directly involved with these planning aspects.

The development of the Comprehensive Program will require specific investigations where adequate data are not available. Studies of existing water supply and waste treatment facilities, economic and population data, stream dynamics and water use-waste load relationships will be undertaken in cooperation with local, State, Interstate and other Federal agencies having responsibility for water pollution control and water resources development. The studies will be coordinated with the activities of the International Joint Commission's work in the Red River of

the North area and with the activities of the Missouri Basin Inter-Agency Committee and its Standing Committee for Comprehensive Planning in the Missouri Basin. The following specific activities are planned.

Inventories - Inventories of existing water facilities will be made to provide data on the present use of surface and ground water for domestic, municipal, industrial, agricultural water supplies; navigation, irrigation, and other purposes. These inventories will contain information on uses, amount of water used, location of withdrawal, water supply systems, and treatment facilities.

Water pollution inventories will provide necessary information on all sources of pollution such as location, kind, amount, and characteristics of the wastes. Sources of pollution will include combined sewer overflows, surface runoff, municipal and industrial sewer system outfalls, waste treatment facilities, and agricultural waste waters.

Economic and Population Studies - Economic projections, based on data provided by the Office of Business Economics of the Department of Commerce will be made for the entire River Basin. These projections will provide a basis on which to forecast future industrial development, inclusing projected size of plants, distribution of labor

force and job opportunities.

Estimates of future water use and needs and types and amounts of resulting wastes of municipal growth and industrial activities will be developed for the basin.

Stream Dynamics - These studies will include detailed measurements of the present physical, chemical, and biological qualities of water of the area. Past records will be evaluated and detailed measurements made to determine the amounts, distribution and seasonal variation in quality. A computerized storage and retrieval system will be employed to make these data readily available for any given area. Hydrologic studies will be made to measure the velocity, depth, turbulence, stratification, effects of impoundments, regulating devices and other physical characteristics of the waterways.

Interpretations of these data will show cause and extent of water quality deterioration; effect of various hydraulic features on water quality and indicate where protective measures are needed to maintain suitable water quality. The implementation of a Comprehensive Water Pollution Control Program will minimize the various pollutional problems as well as provide a basis for future development.

Comprehensive Management Program

Knowledge obtained from these complex interrelated studies will give a picture of the present and past conditions of the water resources system. Estimates of future water requirements and waste discharges, based on economic and demographic studies, runoff, hydrologic features, and other data will provide a base from which remedial and protective measures required to achieve the desired objective of managing the water quality of the basin can be determined. These data will be used in the development and application of mathematical analyses or models that will provide:

1. information relative to those factors which affect water quality for different development conditions, existing at predetermined times in a given area.
2. information relative to the effectiveness of alternative investments, permitting the selection of the least cost combinations of alternatives, which will accomplish a specific pollution control (i.e., water quality) condition.

Guidelines relating to water resource development projects, beneficial water use, treatment technology, and planning constraints will be established to assure optimum water pollution control and quality management. The Comprehensive program will be based on the projection of future conditions. The completed plan will be flexible in order to allow future

generations the greatest choice of alternatives in the conservation, development and use of the water and related land resources.

Organization

It is estimated that seven years will be required to complete the Missouri-Souris-Red River Basins Study. Early attention will be given to the development of a model of the Kansas River system. The model will first be used to determine the adequacy of the existing data in evaluating the effects of increased loadings on stream quality.

The effects of mainstream reservoir operations on water quality will also receive early attention.

The Kansas City Regional Office, at the confluence of the Kansas and Missouri Rivers, will be headquarters for the project. This provides a central location within 300 miles of many of the major water quality problems existing on the lower reaches of the Missouri River and its major tributaries. Field offices will be established to facilitate studies in the areas of the headwaters of the Missouri River and the drainages of the Souris and Red Rivers of the North. Portable laboratories will be used in the field investigations and later in the program, a central laboratory will be established in the Kansas City area.

It is envisioned that a project staff of 60 people will be ultimately required.

MISSOURI-SOURIS-RED RIVER BASINS COMPREHENSIVE PROJECT

STUDY AREA

DEPARTMENT OF THE INTERIOR

FEDERAL WATER POLLUTION CONTROL ADMINISTRATION

MISSOURI BASIN REGION KANSAS CITY, MISSOURI

GSA KANSAS CITY MO 1451 W